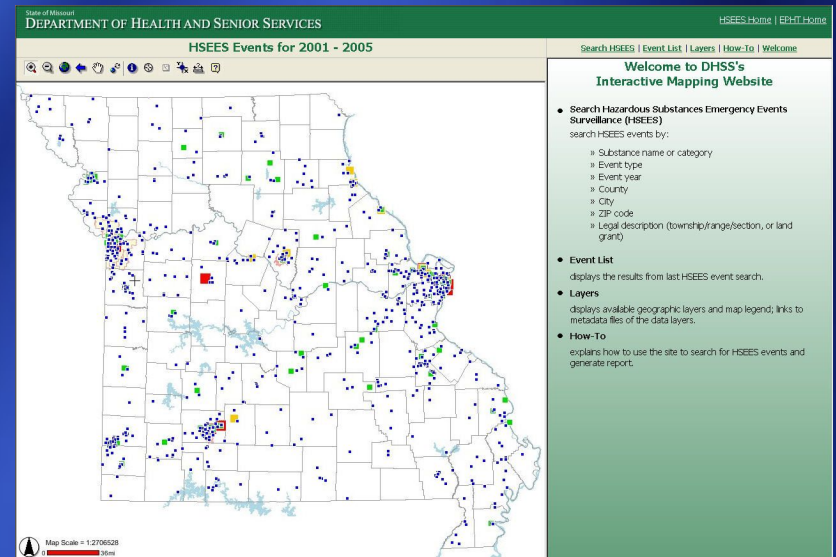
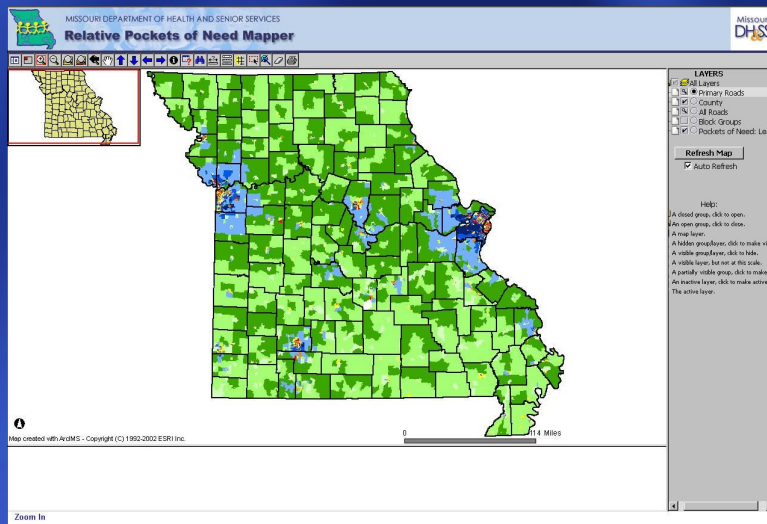


Using Interactive Web Mappers to Improve Public Health In Missouri



A Presentation to the 2006 Environmental Public Health Tracking Conference

By Jeff Patridge

**Missouri Office of Administration
Information Technology Services
Division**



**There are two kinds of people,
those who do the work and
those who take the credit. Try
to be in the first group; there is
less competition there.**

Indira Gandhi





I would rather work less and do the things that I really want to do.

- Sandy Duncan

Web Mapping Tools

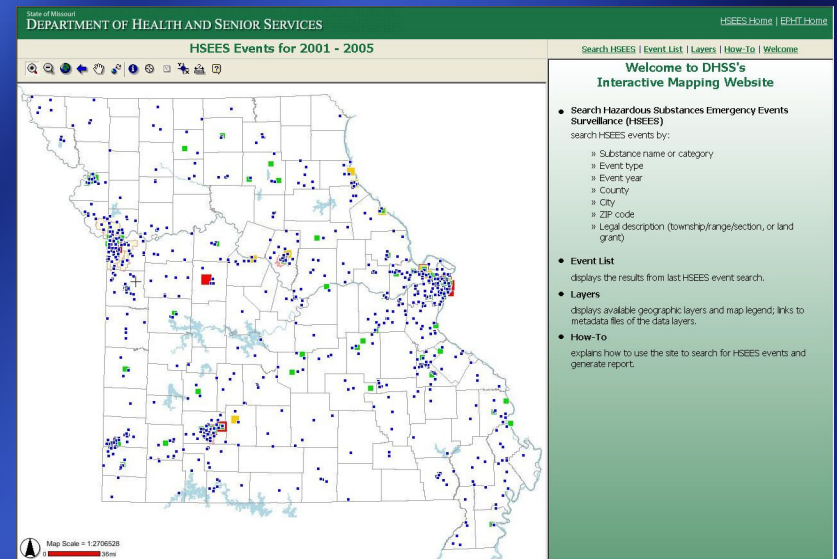
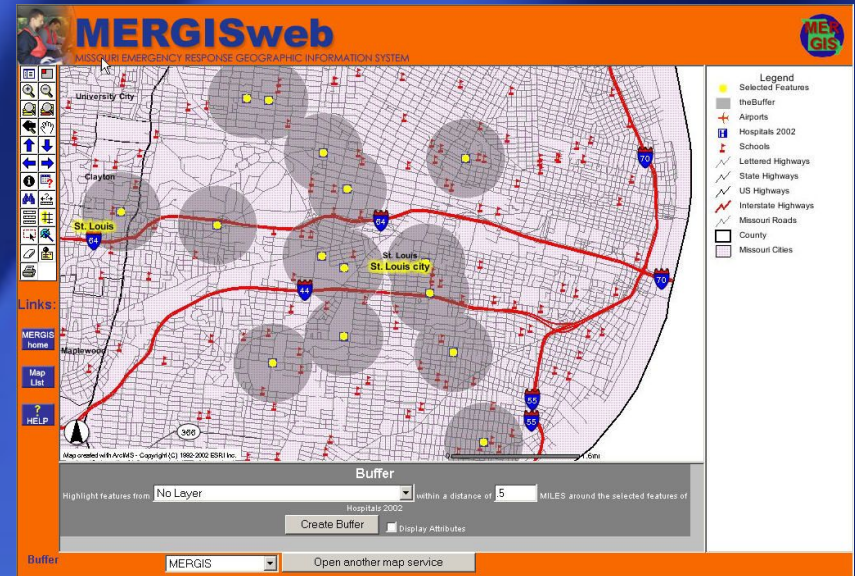
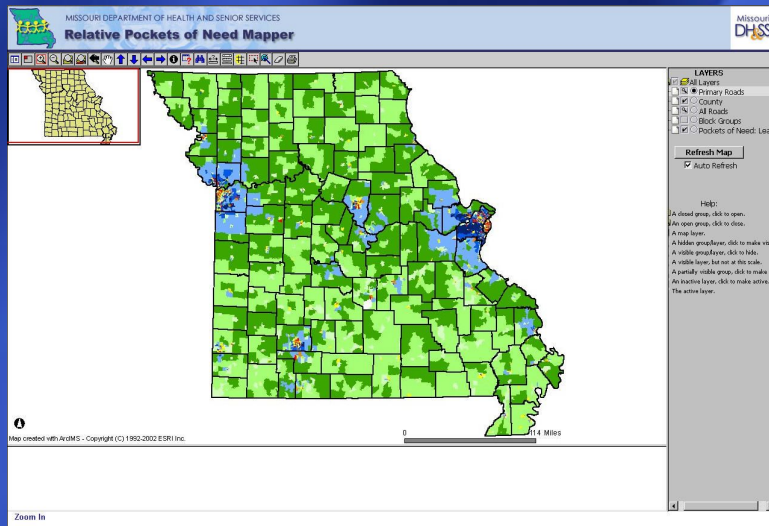
MAPQUEST

Google
Earth

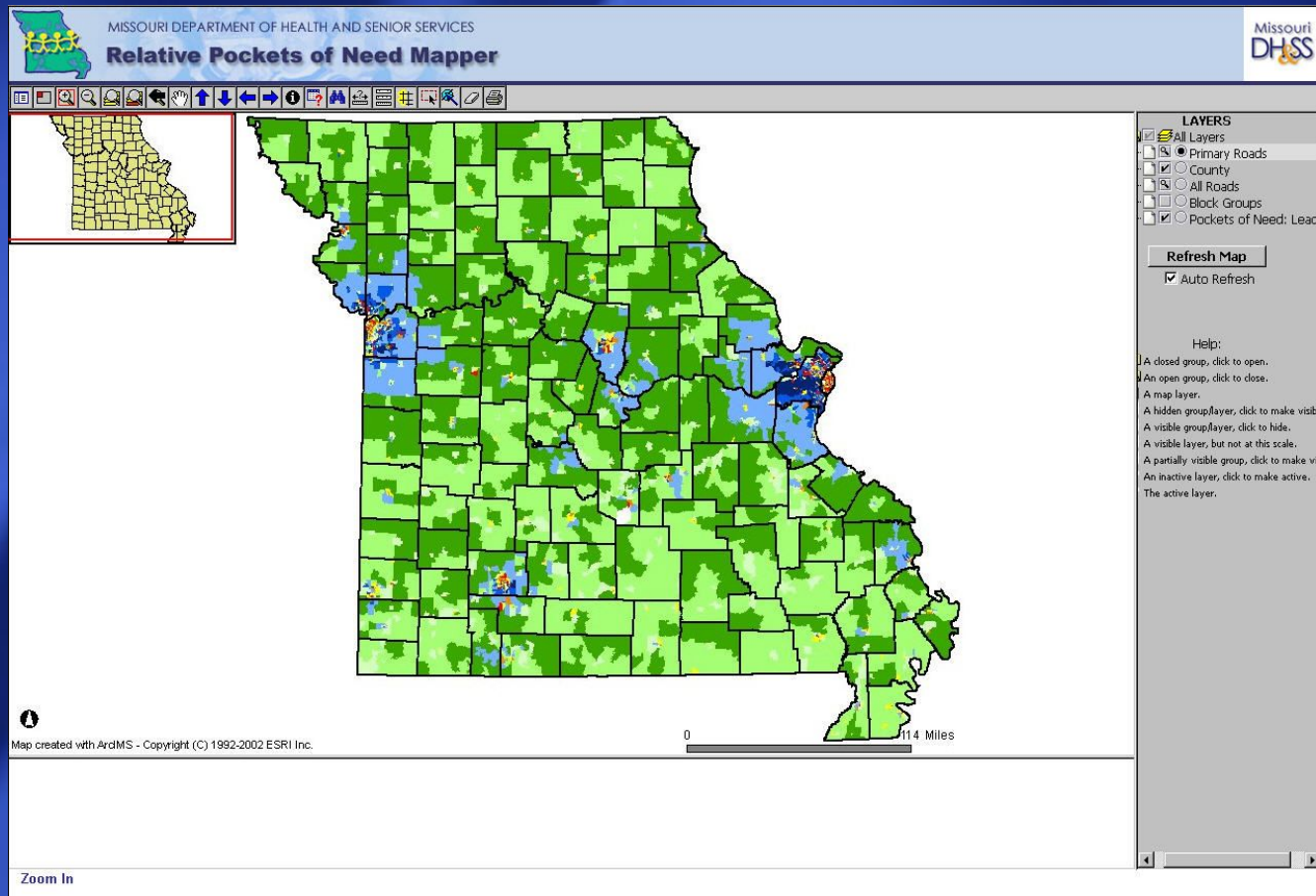
 Windows Live Local
powered by Virtual Earth **Beta** storage

YAHOO! LOCAL
Maps **BETA**

Missouri Department of Health and Senior Services Interactive Web Mappers



Relative Pocket of Need Mapper (RPON)



Relative Pocket of Need Mapper (RPON)

- **First product developed by the Missouri EPHT Team**
- **Is an ESRI ArcMap Service**
- **Based on Missouri's Relative Pocket of Need Formula**

Relative Pocket of Need (Lead) Main Equation

$$\mathbf{RPoN}_{\text{Pb}} = \frac{\mathbf{P}}{\mathbf{Area}} \bullet (F_1 - F_2)$$

Relative Pocket of Need (Lead) Main Factor Equation

$$F_n = \left(\left(\frac{\mathbf{M}_s}{\sum \mathbf{M}} \right) \bullet \mathbf{V}_s \right) + \left(\left(\frac{\mathbf{M}_R}{\sum \mathbf{M}} \right) \bullet \mathbf{V}_R \right) + \left(\left(\frac{\mathbf{M}_{\text{Pb}}}{\sum \mathbf{M}} \right) \bullet \mathbf{V}_{\text{Pb}} \right)$$

Relative Pocket of Need Sub-Factor Equation (F_1 Main Factor)

$$\mathbf{V}_f = \left(\left(\frac{\mathbf{m}_1}{\sum \mathbf{m}} \right) \bullet e^{\left(\frac{\mathbf{xv}_1 - \bar{\mathbf{X}}_{\mathbf{v}_1}}{\mathbf{SDv}_1} \right)} \right) + \dots \left(\left(\frac{\mathbf{m}_n}{\sum \mathbf{m}} \right) \bullet e^{\left(\frac{\mathbf{xv}_n - \bar{\mathbf{X}}_{\mathbf{v}_n}}{\mathbf{SDv}_n} \right)} \right)$$

Relative Pocket of Need Sub-Factor Equation (F_2 Main Factor)

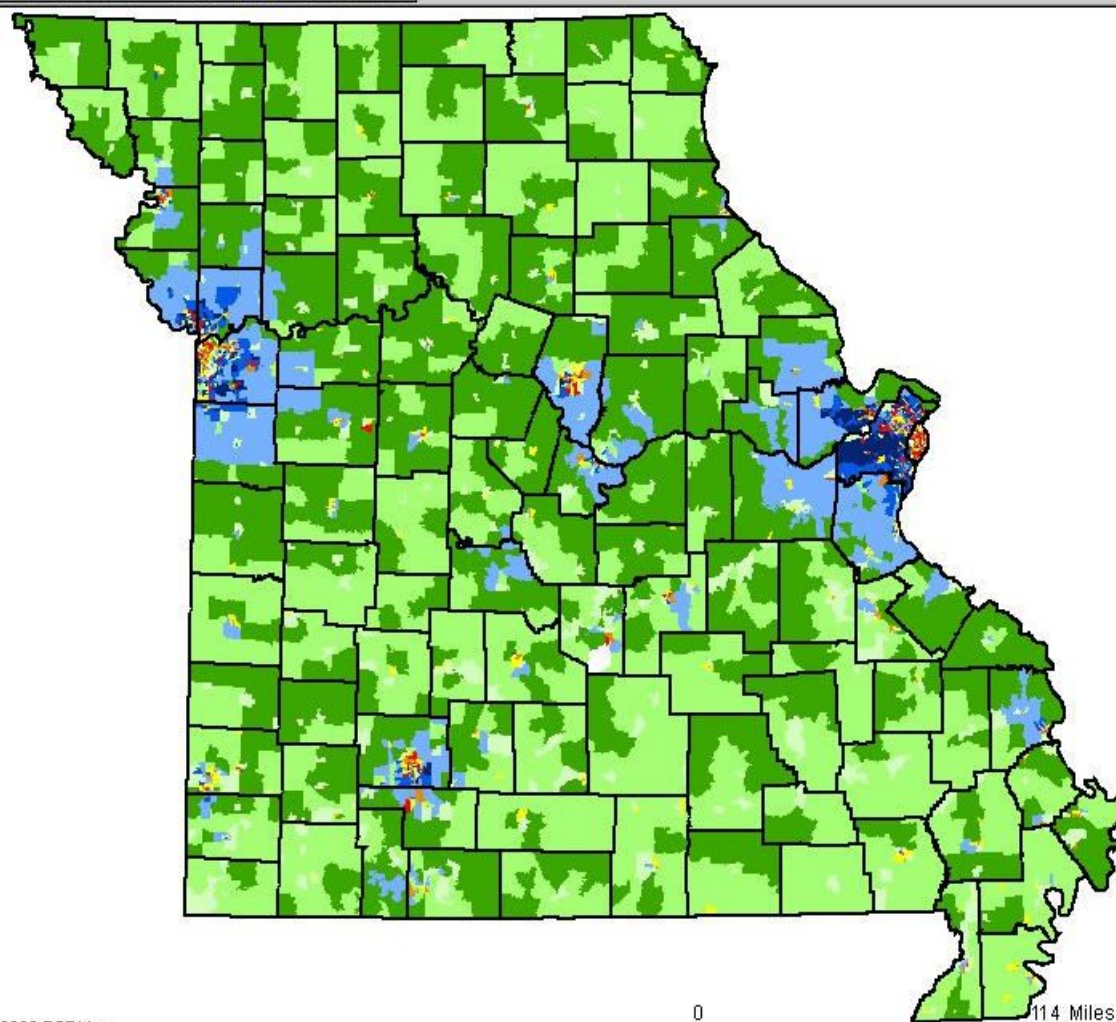
$$\mathbf{V}_f = \left(\left(\frac{\mathbf{m}_1}{\sum \mathbf{m}} \right) \bullet e^{-\left(\frac{\mathbf{xv}_1 - \bar{\mathbf{X}}_{\mathbf{v}_1}}{\mathbf{SDv}_1} \right)} \right) + \dots \left(\left(\frac{\mathbf{m}_n}{\sum \mathbf{m}} \right) \bullet e^{-\left(\frac{\mathbf{xv}_n - \bar{\mathbf{X}}_{\mathbf{v}_n}}{\mathbf{SDv}_n} \right)} \right)$$

Conceptual Model for the Lead RPoN

- Ranks (Orders) Areas in Relationship to One Another Based on Related Types of *Need*
 - Social
 - » Median Household Income
 - » Median Housing Value
 - Rental
 - » Number of Rentals
 - » Median Cost of Rentals
 - Lead
 - » Number of Houses Older than 1950



Relative Pockets of Need Mapper



Map created with ArcIMS - Copyright (C) 1992-2002 ESRI Inc.

LAYERS

- ☒ All Layers
- ☐ Primary R
- ☒ County
- ☐ All Roads
- ☐ Block Gro
- ☒ Pockets

Refresh Map

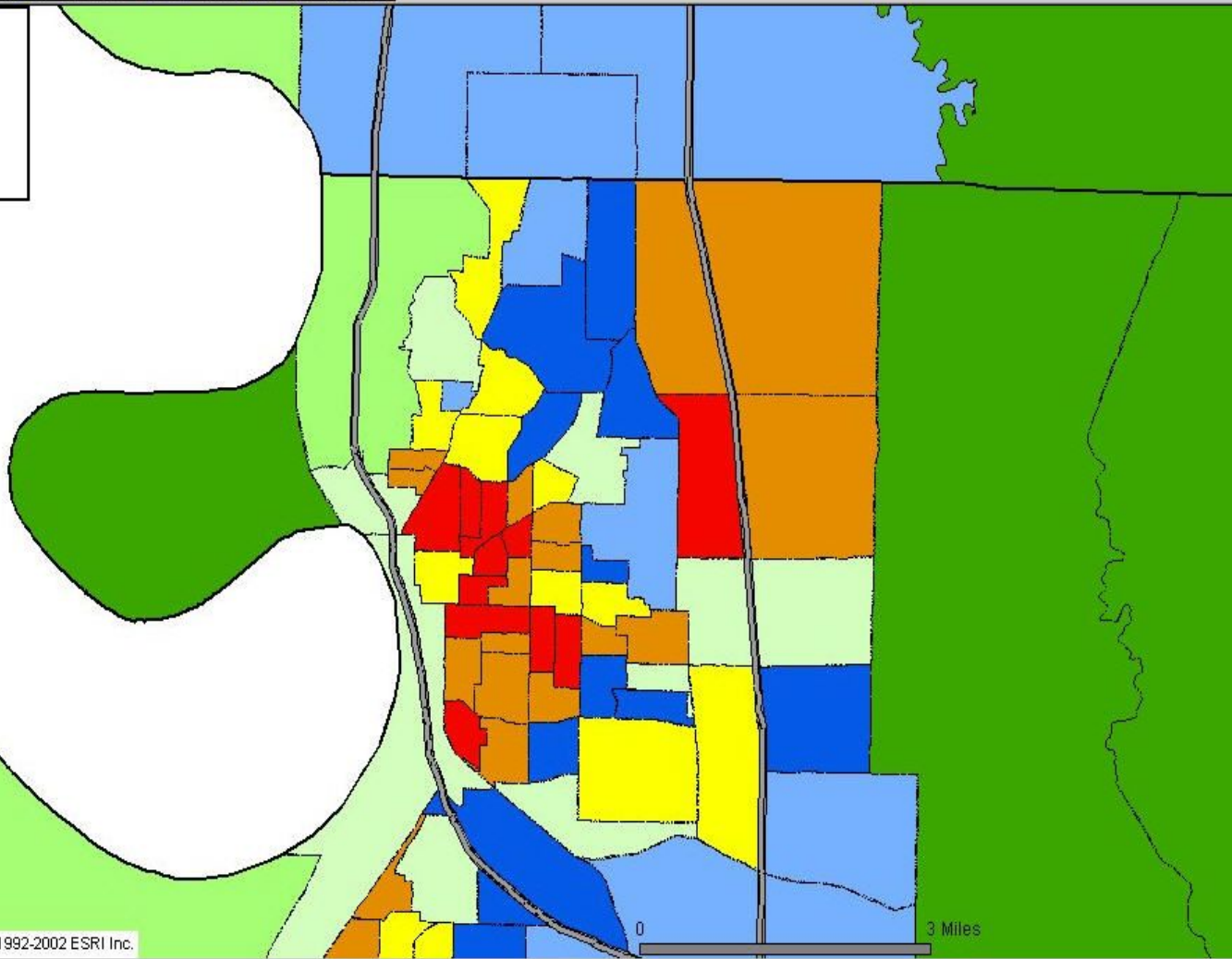
- ☒ Auto Refre

Help:

- A closed group, click to
- An open group, click to
- A map layer.
- A hidden group/layer,
- A visible group/layer,
- A visible layer, but not
- A partially visible group
- An inactive layer, click
- The active layer.



Relative Pockets of Need Mapper



- LAYERS**
- ☒ All Layers
 - ☒ Primary Roads
 - ☒ County
 - ☒ All Roads
 - ☒ Block Groups
 - ☒ Pockets of Need: Lead

Refresh Map

☒ Auto Refresh

Help:

- A closed group, click to open.
- An open group, click to close.
- A map layer.
- A hidden group/layer, click to make visible.
- A visible group/layer, click to hide.
- A visible layer, but not at this scale.
- A partially visible group, click to make fully visible.
- An inactive layer, click to make active.
- The active layer.

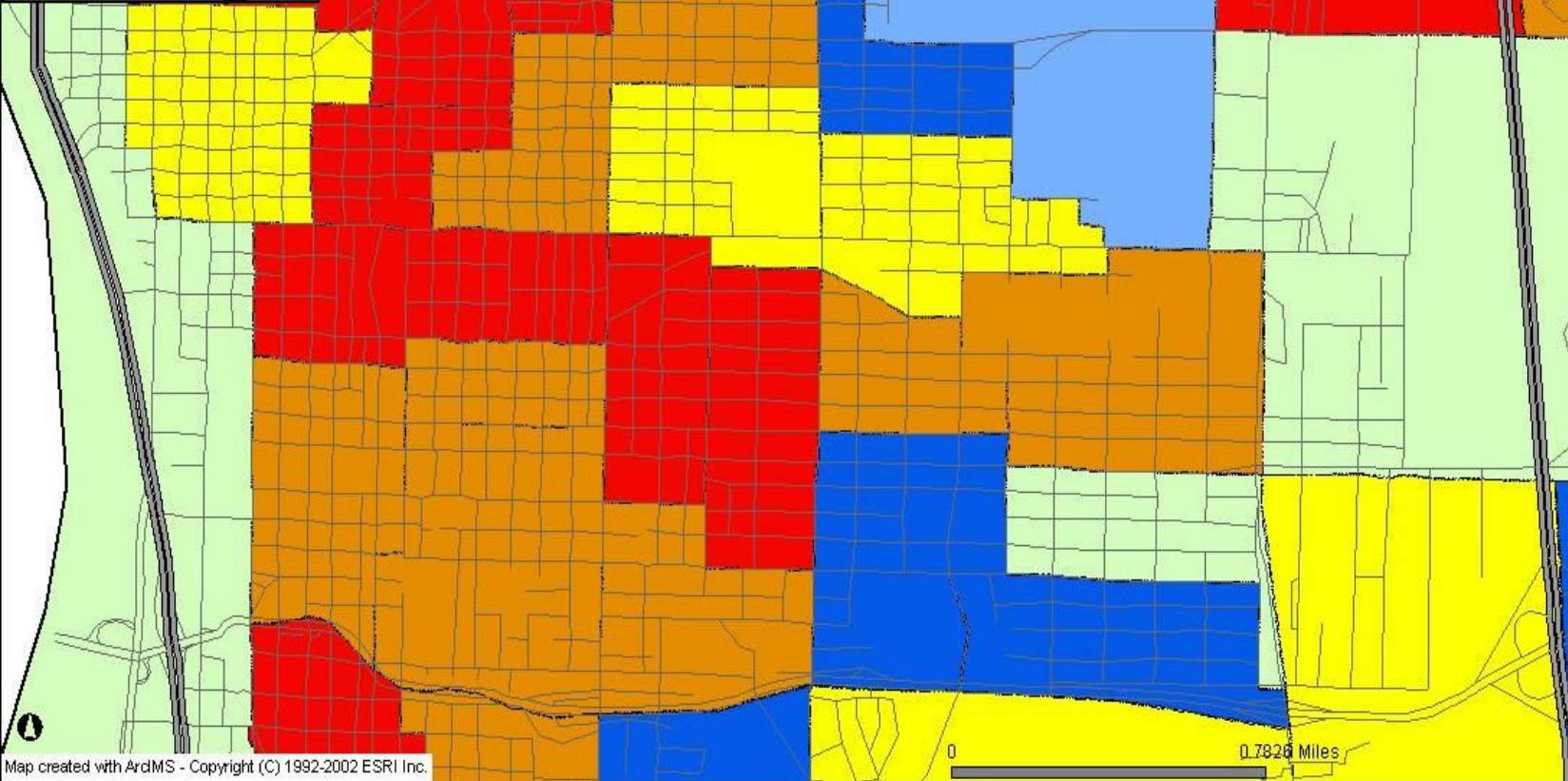
Map created with ArcIMS - Copyright (C) 1992-2002 ESRI Inc.

Pockets of Need: Lead is now the Active Layer

Zoom Out



Relative Pockets of Need Mapper



Map created with ArcIMS - Copyright (C) 1992-2002 ESRI Inc.

Pockets of Need: Lead is now the Active Layer

- LAYERS**
- ☒ All Layers
 - ☒ Primary Roads
 - ☒ County
 - ☒ All Roads
 - ☒ Block Groups
 - ☒ Pockets of Need: L

Refresh Map

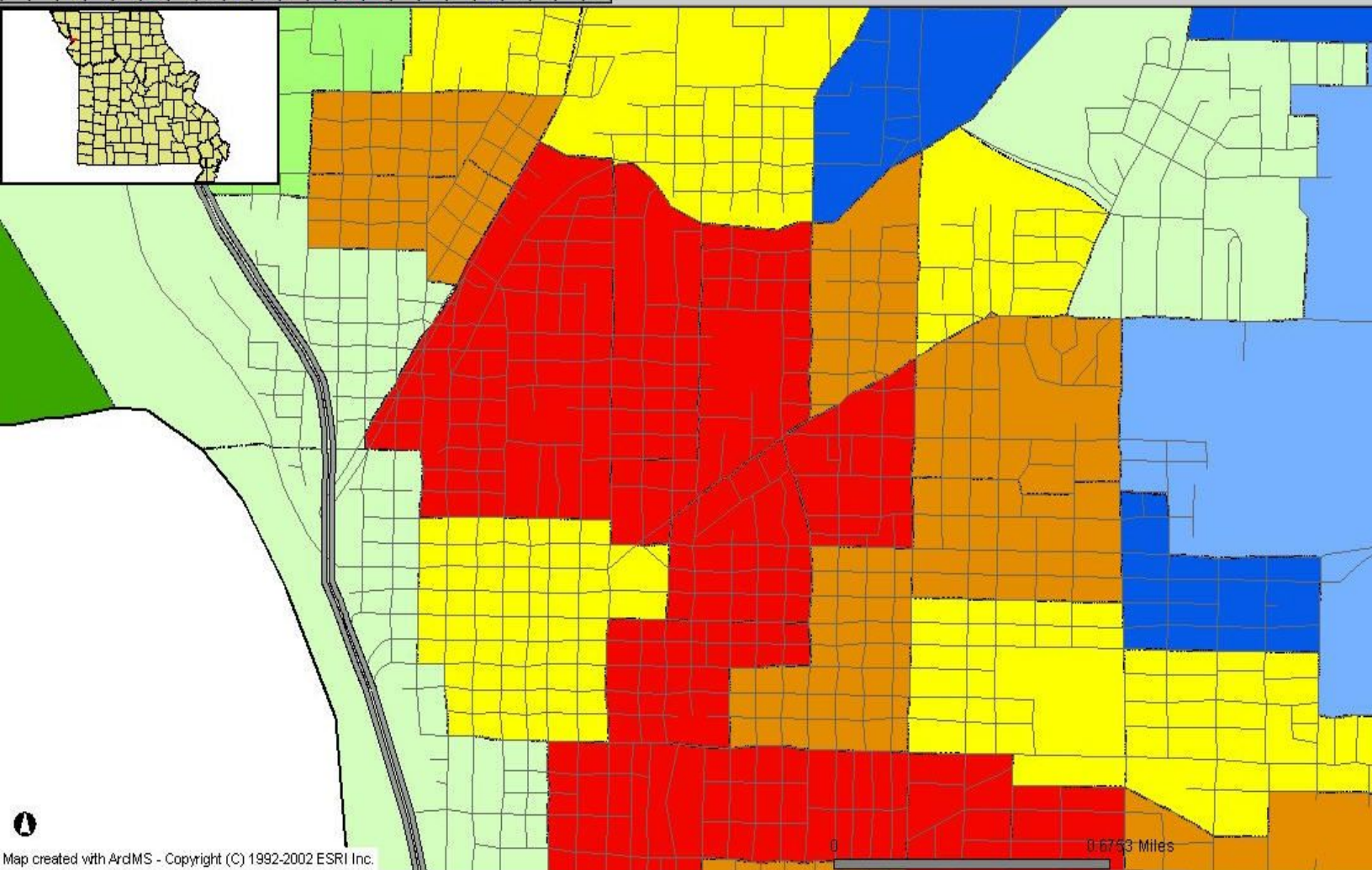
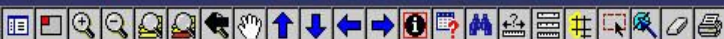
☒ Auto Refresh

Help:

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- A visible group/layer, click to hide.
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- A partially visible group, click to make fully visible.
- An inactive layer, click to make active.
- The active layer.



Relative Pockets of Need Mapper



Map created with ArcIMS - Copyright (C) 1992-2002 ESRI Inc.

Pockets of Need: Lead

Rec	COUNTY	TRACT	BLOCK GROUP	POPULATION 2000	POPULATION UNDER 6	MEDIAN HOUSEHOLD INCOME	MEDIAN HOUSING VALUE	TOTAL RENTER OCCUPIED UNITS	MEDIAN GROSS RENT	UNITS BUILT PRIOR TO 1950	POCKET OF NEED SCORE UNCORRECTED FOR AREA	POCKET OF NEED SCORE
1	021	001100	4	957	131	26389	44200	212	426	366	93.7021810154209	0.000279054041416

LAYERS

- ☒ All Layers
- ☒ Primary Roads
- ☒ County
- ☒ All Roads
- ☒ Block Groups
- ☒ Pockets of Need: Lead

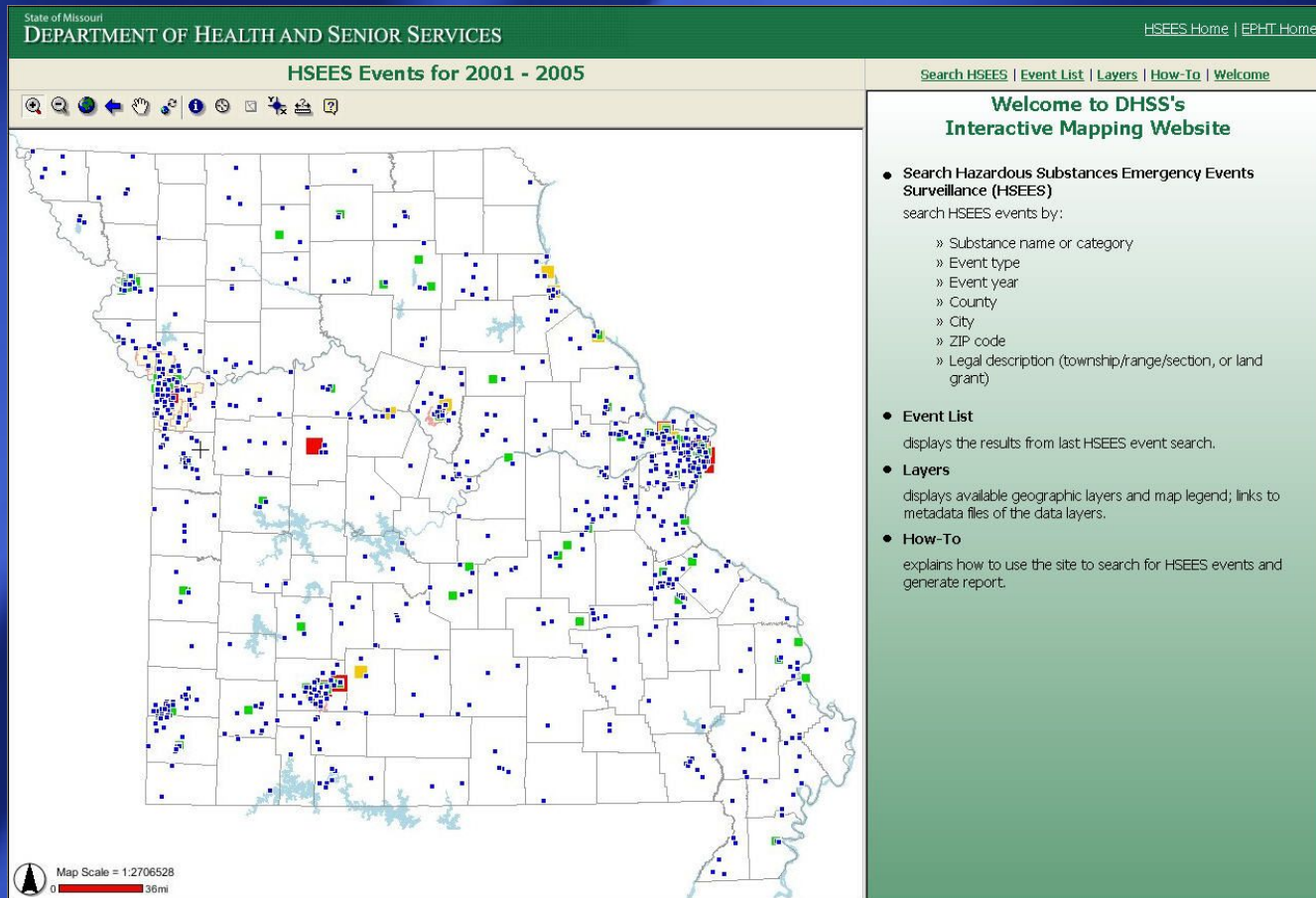
Refresh Map

☒ Auto Refresh

Help:

- A closed group, click to open.
- An open group, click to close.
- A map layer.
- A hidden group/layer, click to make visible.
- A visible group/layer, click to hide.
- A visible layer, but not at this scale.
- A partially visible group, click to make fully visible.
- An inactive layer, click to make active.
- The active layer.

Environmental Mapper

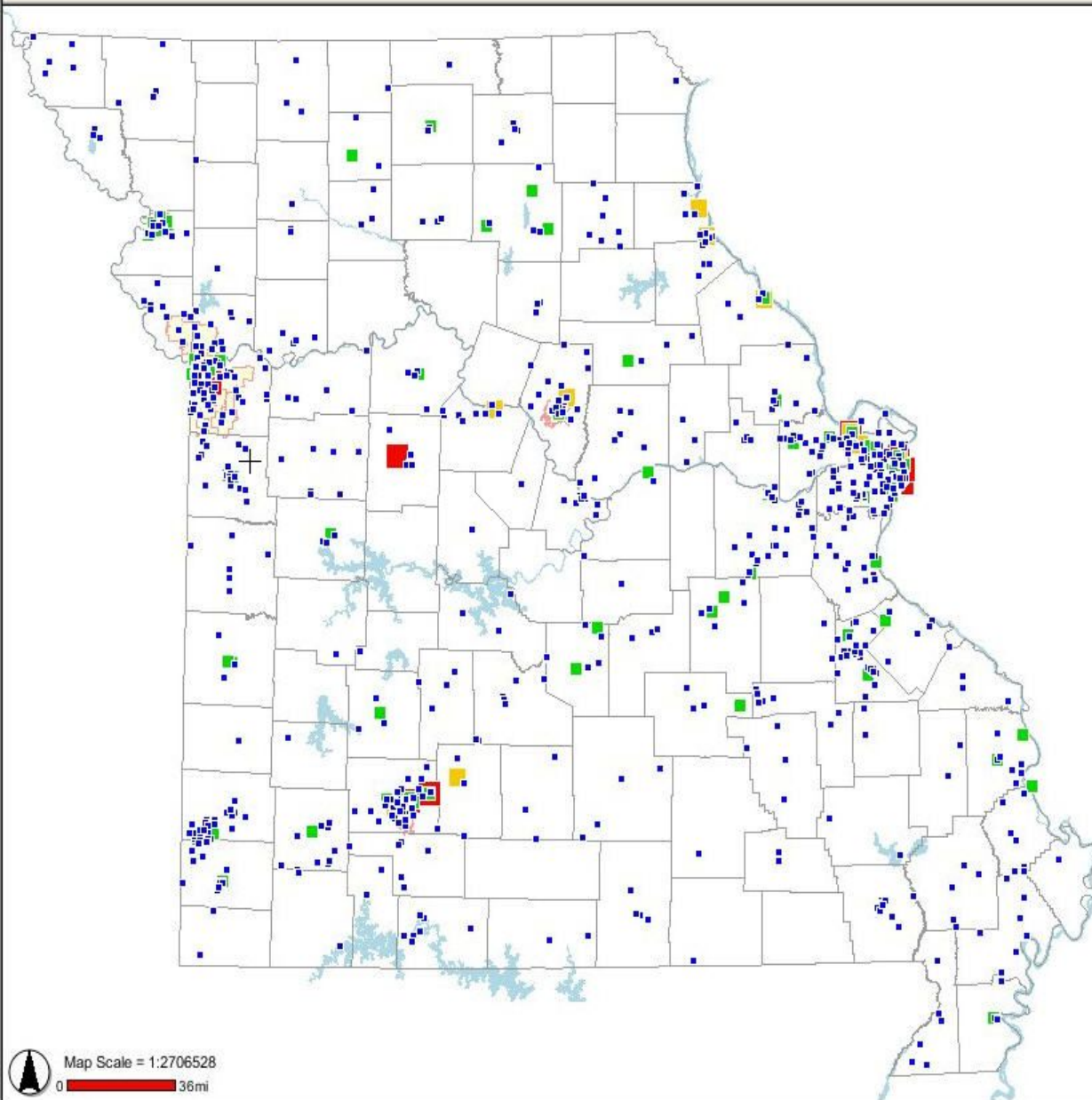


Environmental Mapper

- **A collaboration between the Missouri EPHT Team, Missouri Hazardous Substance Emergency Events Surveillance Program, and the Center for Agricultural, Resource and Environmental Systems (CARES).**
- **Based on ESRI's ArcIMS software**
- **Customized with Visual Basic, HTML, and JAVA**

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)



Welcome to DHSS's Interactive Mapping Website

- **Search Hazardous Substances Emergency Events Surveillance (HSEES)**

search HSEES events by:

- » Substance name or category
- » Event type
- » Event year
- » County
- » City
- » ZIP code
- » Legal description (township/range/section, or land grant)

- **Event List**

displays the results from last HSEES event search.

- **Layers**

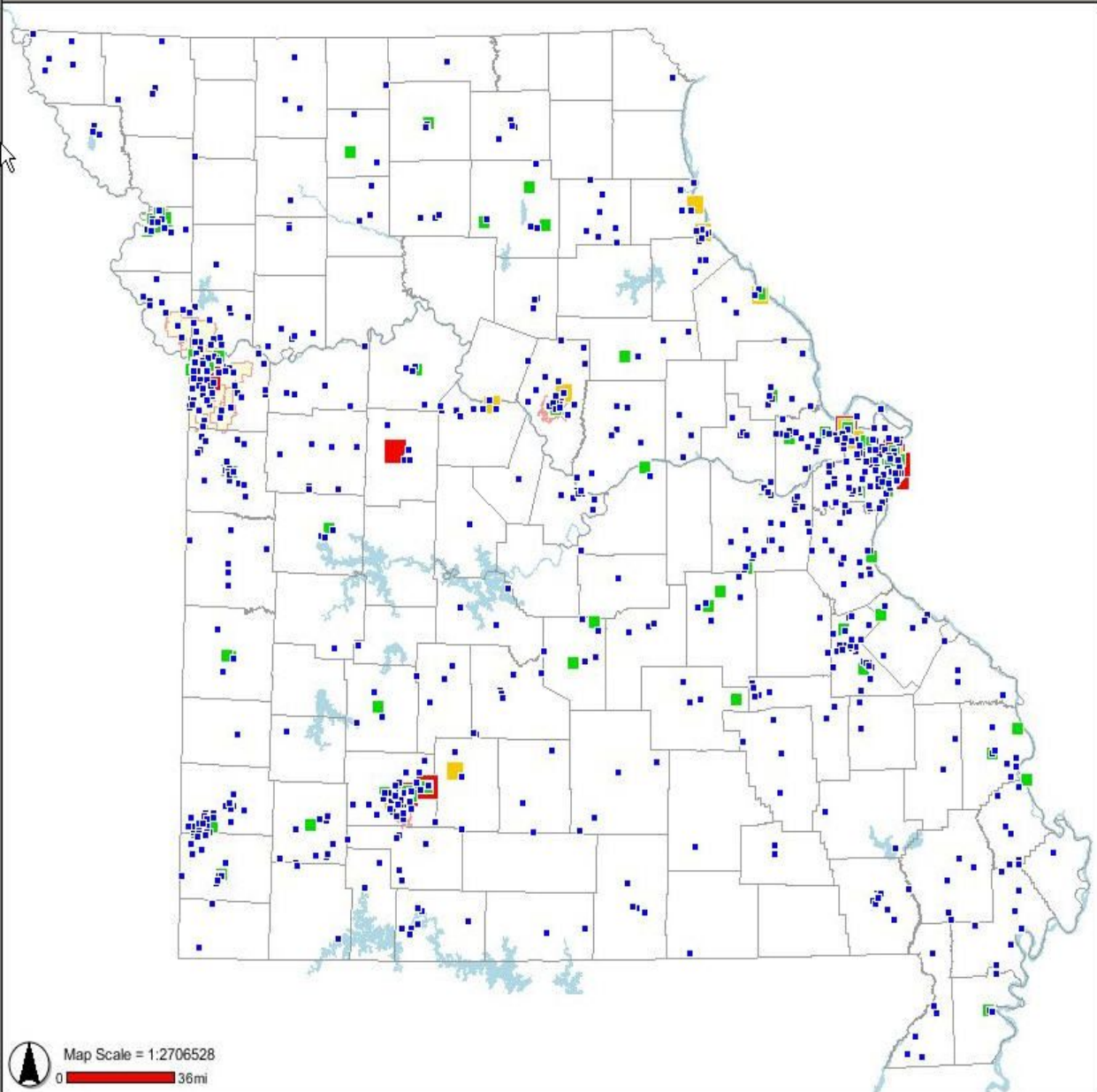
displays available geographic layers and map legend; links to metadata files of the data layers.

- **How-To**

explains how to use the site to search for HSEES events and generate report.

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)



Search HSEES Events

Search By Events:

Substance: ☒ Name ☐ [Category](#)

Top 20 Substances:

Acetone
Acid
Adhesive
Ammonia

Event Type: ☒ All Event Types
☐ Fixed-Facility Events
☐ Transportation Events

Limit events to:

Events with Evacuations
Events with Victims
Methamphetamine Events

Event Year:

All Event Years
2005
2004
2003
2002

Search (or refine search) by Area:

County:

City:

ZIP Code:

Legal Description:

[Search](#)

[Reset](#)

Search Tips:

- To search for HSEES databases, type in a substance name (or select from TOP 20 substances), and/or select event types or years. You can refine the search by selecting a county, a ZIP code, or a legal description (section/township/range or

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)



☐ Show all events

Results 1 - 10 of 44

[Zoom To Events](#)

[Generate Report](#)

HSEES EVENTS

MO20040019, 2/3/2004

Ammonia*

Event ID: [MO20040019](#)

Substance Name: Ammonia*

Substance Category: Ammonia

Event Date: 2/3/2004

Event Type: Fixed-Facility Events

Total Victims: 0

Evacuation Ordered: No

Latitude & Longitude: 37.231452, -93.215658

Legal Description: Sec. 10, T29N, R21W, 5th PM

City: Springfield

ZIP Code: 65802

County: Greene

MO20040040, 1/5/2004

Ammonia*, Sulfuric Acid*, Ethyl Ether

MO20040042, 1/7/2004

Acetone, Sulfuric Acid*, Pseudoephedrine, Ammonia*, Solvent NOS, Ethyl Ether, Hydrochloric Acid*, PROTEAT, Acid NOS, Phosphorus, Sodium Hydroxide*

MO20040045, 1/13/2004

Ammonia*, Sulfuric Acid*, Ethyl Ether

MO20040050, 1/17/2004

Ethyl Ether, Ammonia*

MO20040061, 3/11/2004

Ammonia*

MO20040073, 3/15/2004

Ammonia*

MO20040079, 4/4/2004

Ammonia*

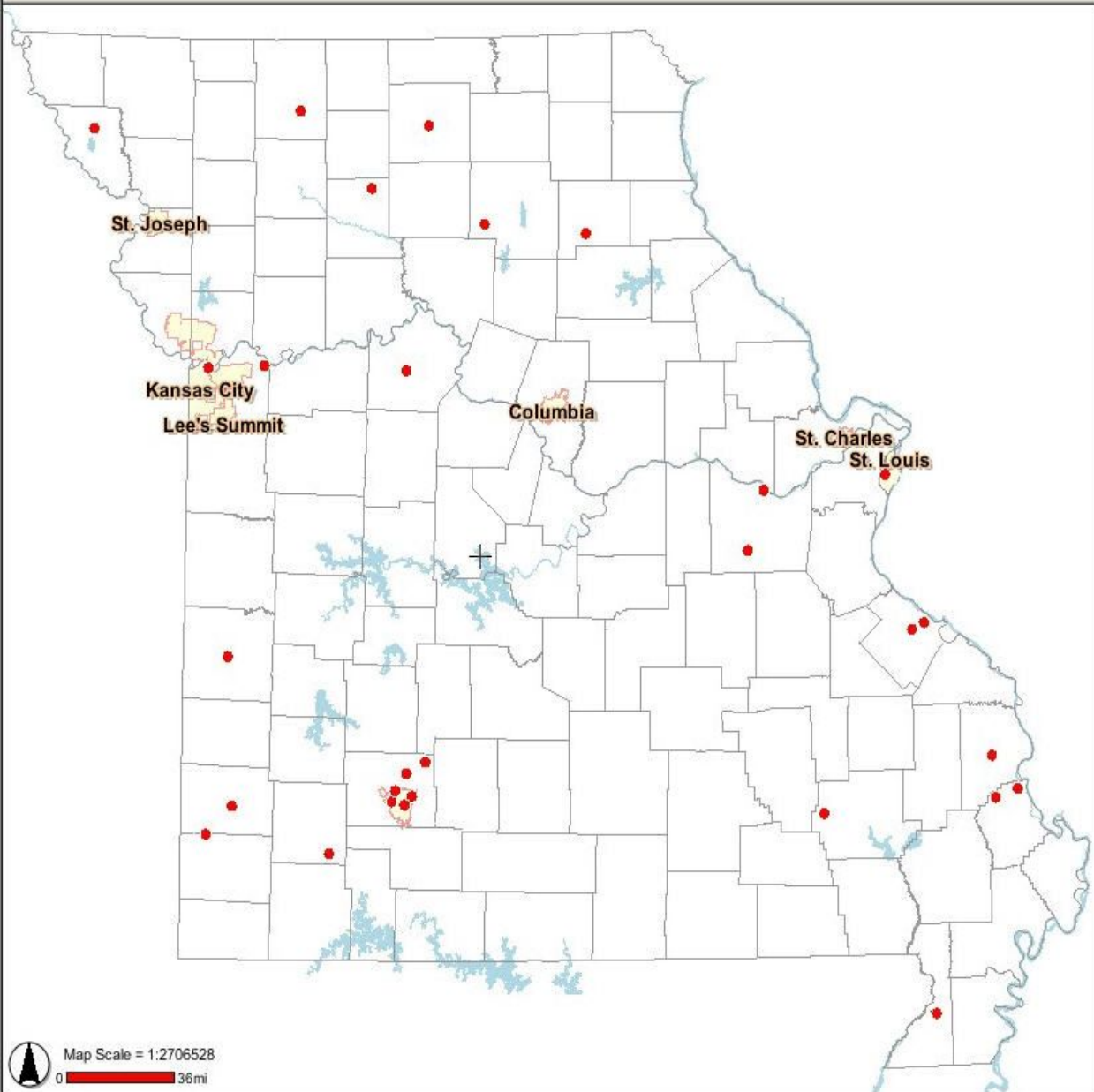
MO20040083, 4/6/2004

Ammonia*

MO20040087, 4/8/2004

Ammonia*

[Next >>](#)



HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)



☐ Show all events

Results 1 - 10 of 44

[Zoom To Events](#)

[Generate Report](#)

HSEES EVENTS

- ☒ **MO20040019**, 2/3/2004
Ammonia*
- ☒ **MO20040040**, 1/5/2004
Ammonia*, Sulfuric Acid*, Ethyl Ether
- ☒ **MO20040042**, 1/7/2004
Acetone, Sulfuric Acid*, Pseudoephedrine, Ammonia*, Solvent NOS, Ethyl Ether, Hydrochloric Acid*, PROTEAT, Acid NOS, Phosphorus, Sodium Hydroxide*
- ☒ **MO20040045**, 1/13/2004
Ammonia*, Sulfuric Acid*, Ethyl Ether
- ☒ **MO20040050**, 1/17/2004
Ethyl Ether, Ammonia*

Event ID:	MO20040050
Substance Name:	Ammonia*
Substance Category:	Ammonia
Substance Name:	Ethyl Ether
Substance Category:	Volatile organic compounds (VOC's)
Methamphetamine Type:	Lab
Event Date:	1/17/2004
Event Type:	Fixed-Facility Events
Total Victims:	1
Evacuation Ordered:	No
Latitude & Longitude:	37.33217, -93.24926
Legal Description:	Sec. 9, T30N, R21W, 5th PM
City:	Fair Grove
ZIP Code:	65803
County:	Greene

- ☒ **MO20040061**, 3/11/2004
Ammonia*
- ☒ **MO20040073**, 3/15/2004
Ammonia*
- ☒ **MO20040079**, 4/4/2004
Ammonia*
- ☒ **MO20040083**, 4/6/2004
Ammonia*
- ☒ **MO20040087**, 4/8/2004
Ammonia*

[Next »](#)

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)

Report Options

Title:	Hazardous Substance Emergency Events Surveillance Report
Subtitle: (optional)	<input type="text"/>
Format:	<input checked="" type="radio"/> HTML <input type="radio"/> PDF
Risk Population Search Radius:	<input type="text" value="1"/> Miles (Valid range: 0.25 - 10)
Area Limit:	<input checked="" type="radio"/> None (all query results) <input type="radio"/> Limit to current map area

[Generate Report \(pop-up\)](#)

Tips:

1. If HTML format is used, set your page margins to **0.75 inch or less** on each side before sending map to the printer.
2. Make sure pop-up blocker is disabled.



DEPARTMENT OF HEALTH AND SENIOR SERVICES

Hazardous Substance Emergency Events Surveillance Report

Report Prepared 3/31/2006

Event Selection Summary

Selection Criteria

Substance Name contains '*Ammonia*' AND Year = '2004' AND Latitude > 37.3286 AND Longitude > -93.2542 AND Latitude < 37.3358 AND Longitude < -93.2443;

Total Events	Transportation	Fixed-Facility	Meth. Related
1	0	1	1

Victims	Evacuations	Event Date
1	0	1/17/2004

County (Number of Events)

Greene (1)

Event Substances (Number of Events) - 2 unique substances

Ammonia* (1) Ethyl Ether (1)

Event Substance Categories (Number of Events) - 2 unique categories

Ammonia (1) Volatile organic compounds (VOC's) (1)

Risk Population Summary (within 1 mile of selected events)

Population:

Total Persons	Persons per Square Mile
98	39.6

Schools (Public and Private):

Total Schools	Total Enrollment
0	0

Day Care Facilities:

Total Facilities	Total Enrollment Capacity
0	0

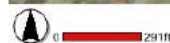
Hospitals:

Total Hospitals	Total Beds
0	0

Nursing Homes:

Total Facilities	Total Beds
0	0

Report Area Map



LEGEND

- Selected HSEES Events
- County Boundaries
- Lakes and Streams

- Roads and Highways
- Interstate
- U.S. highway
- State numbered highway
- State lettered highway
- Principal road
- Street or road



Locator Map

DISCLAIMER:

This information is being provided by the Missouri Department of Health and Senior Services and every effort has been made to assure the accuracy of the data. However, no responsibility is assumed by the department in the use of the data, related materials or how it is represented by those who access this information.

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)



Layers

[Refresh Map](#)

☐ Visible - Display or hide layers

☐ Label - Add or remove layer labels

DHSS Data

- ☒ [HSEES Events](#)
 - 1 event
 - 2 to 5 events
 - 6 to 10 events
 - 11 to 79 events

Base Data

- ☐ ☐ [Hospitals](#)
- ☐ ☐ [Nursing Homes](#)
- ☐ ☐ [Day Care Facilities](#)
- ☐ ☐ [Schools](#)
- ☒ ☐ [County Boundaries](#)
- ☒ [Roads and Highways](#)
 - ☒ Interstate
 - ☒ U.S. highway
 - ☒ State numbered highway
 - ☒ State lettered highway
 - ☒ Principal road
 - ☒ Street or road
- ☐ ☐ [Railroads](#)
- ☐ ☐ [Public Land Survey \(Twn/Rng/Sec\)](#)
 - ☐ Section boundary
 - ☐ Land grant boundary
 - ☐ Township boundary
- ☐ ☐ [ZIP Code Boundaries](#)
- ☒ ☒ [Cities and Towns](#)
 - ☐ Incorporated areas
 - ☐ Other places
- ☒ ☒ [Lakes and Streams](#)
- ☒ [1994-2000 Aerial Photos](#)

[Refresh Map](#)

DHSS HSEES Viewer Layer Description - Microsoft Internet Explorer provided by DHSS

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print W SnagIt

HSEES Events

Hazardous Substances Emergency Events Surveillance (HSEES) events are defined as the release of any substance (excluding petroleum and petroleum products) that might reasonably be expected to cause adverse human health outcomes. These releases, or events, are defined as the uncontrolled or illegal release of hazardous substances, and can occur as a result of transportation incidents, employee error, equipment failure, illegal actions, intentional acts, or acts of nature. Threatened releases are also reported. A threatened release is defined as an event where a hazardous substance is not actually discharged into the environment, but the threatened release results in an emergency action (for example, an evacuation) that can potentially impact the health of employees, responders and/or the general public.

Date: August, 2005
Source: Missouri Department of Health and Senior Services (DHSS)
Full Metadata: [HSEES Events](#)

Hospitals

Medical and mental health facilities which typically provides inpatient, outpatient, diagnostic and therapeutic services.

Date: February, 2004
Source: Missouri Department of Health and Senior Services (DHSS)
Full Metadata: [hospitals](#)

Nursing Homes

Long term care facilities providing personal care services to the older population, chronically ill.

Date: March, 2004
Source: Missouri Department of Health and Senior Services (DHSS)
Full Metadata: [nursing homes](#)

Day Care Facilities

Hazardous Substances Emergency Events Surveillance Database - Microsoft Internet Explorer provided by...

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print W SnagIt

Hazardous Substances Emergency Events Surveillance Database

Metadata also available as

Metadata:

- [Identification Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification Information:

Citation:

Citation Information:

Originator: Missouri Department of Health and Senior Services
Publication Date: Unpublished Material
Title: Hazardous Substances Emergency Events Surveillance Database
Online Linkage:

Description:

Abstract:

Missouri began participating in the Hazardous Substances Emergency Events Surveillance...

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)

Geographic Coordinates

Latitude	<input type="text" value="39.3749"/>	
	<input n"="" type="text" value="39° 22' 29.6"/>	
Longitude	<input type="text" value="-94.3595"/>	
	<input type="text" value="94° 21' 34.2" w"=""/>	
Universal Transverse Mercator (UTM)	<input type="text" value="382899.146"/>	X
	<input type="text" value="4359261.695"/>	Y
	<input type="text" value="15"/>	Zone

[Clear](#)



HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)



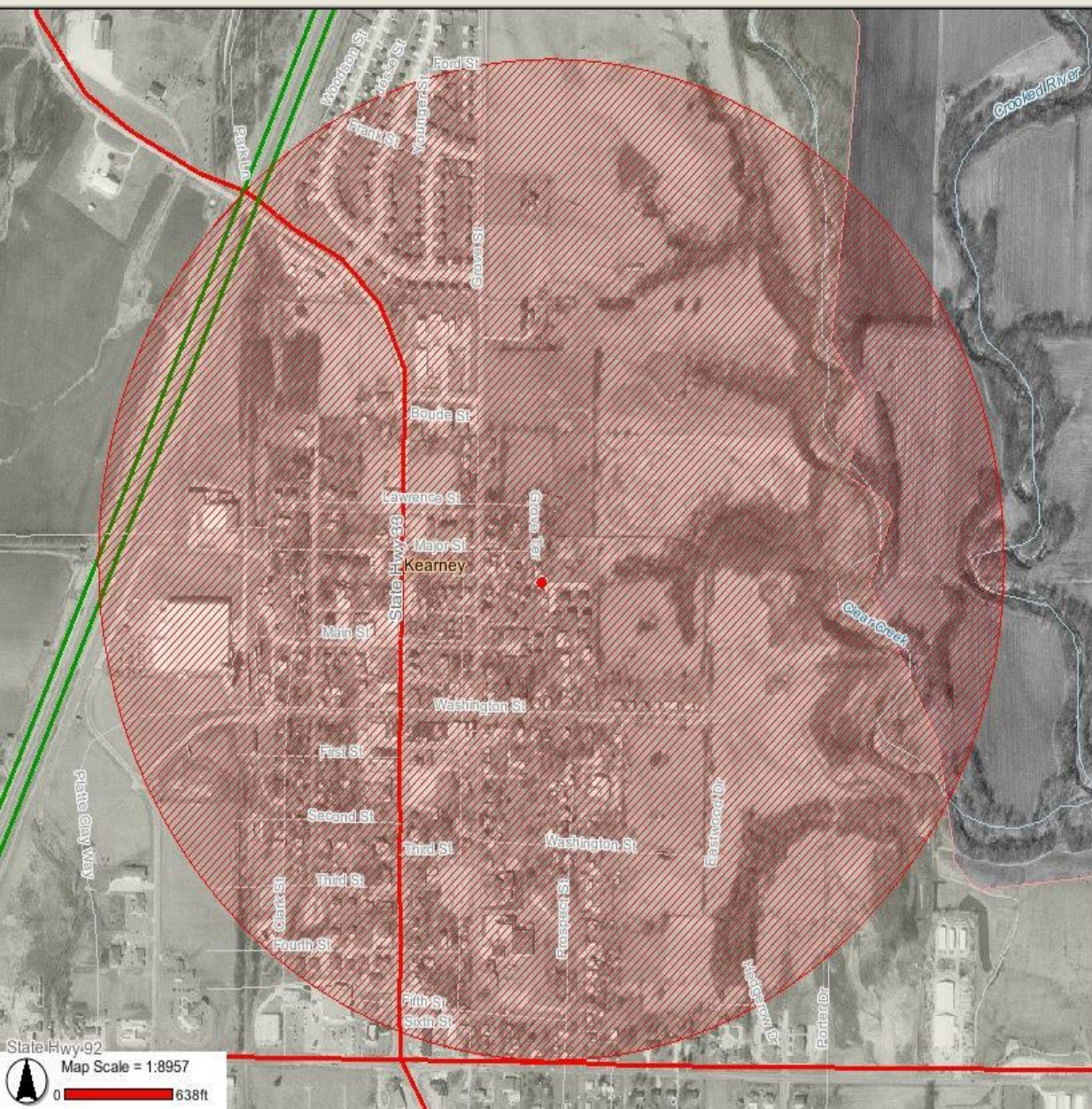
Distance

Segment Distance:	<input type="text" value="1511"/>	Feet
	<input type="text" value="0.29"/>	Miles
Total Distance:	<input type="text" value="1139"/>	Feet
	<input type="text" value="0.22"/>	Miles

Clear

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)



☐ Show all events

1 Event Found

[Zoom To Events](#)

[Generate Report](#)

HSEES EVENTS

MO20050011, 1/14/2005

Hydrochloric Acid

Event ID:	MO20050011
Substance Name:	Hydrochloric Acid
Substance Category:	Acids
Event Date:	1/14/2005
Event Type:	Fixed-Facility Events
Total Victims:	0
Evacuation Ordered:	No
Latitude & Longitude:	39.374908, -94.359505
Legal Description:	Sec. 26, T53N, R31W, 5th PM
City:	KEARNEY
ZIP Code:	64060
County:	Clay

HSEES Events for 2001 - 2005

[Search HSEES](#) | [Event List](#) | [Layers](#) | [How-To](#) | [Welcome](#)

How-To

I. How to search HSEES events?

1. Click on Search HSEES button to open the search form.
2. To search for HSEES events, type in a substance name, and/or select an event type or year. You can refine the search by selecting a county, a ZIP code, or a legal description (section/township/range or landgrant). Click on the 'Search' button to start search.
3. Only one location option is used for search. If multiple location options are selected, the top one is used.
4. Search on substance name is NOT case sensitive. A partial substance name is accepted.

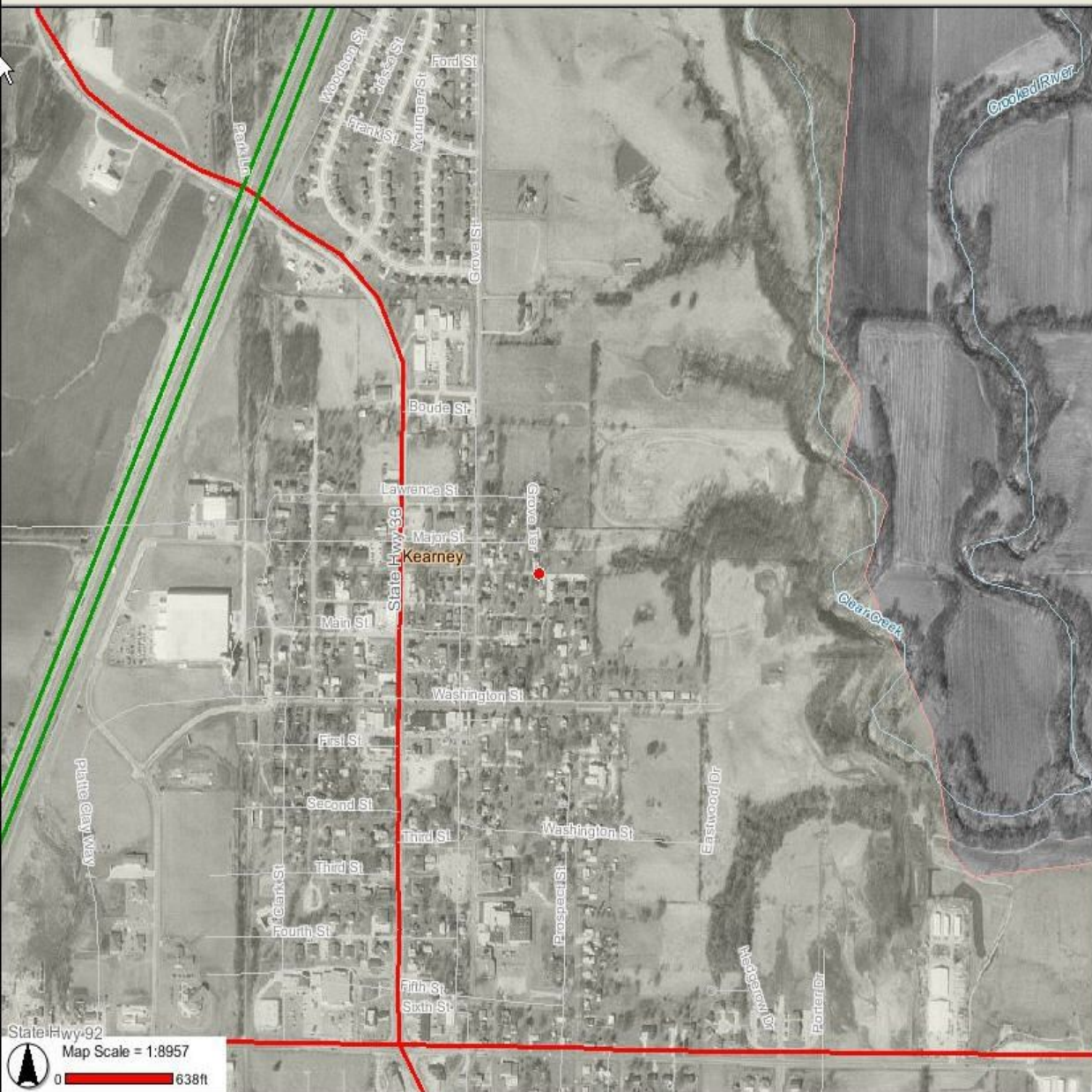
II. How to use the mapping interface?

Use the following tools to change the map viewing area (or map extent):

	Zoom In	Click on a map location to re-center the map and zoom in closer.
	Zoom Out	Click on a map location to re-center the map and zoom out further.
	Full Map Extent	Click this button to view the entire Missouri.
	Last Map Extent	Click this button to go back to the previous map extent.
	Pan	Click on a map location to re-center the map.
	Refresh Map	Click this button to refresh the map.

Use the following tools to select one or more events from the map:

	Identify Events	Drag a rectangle area on the map to select events.
	Radius Buffer	Click on a map location to select events within a user-specified buffer radius distance.
	Clear Selection	Click this button to clear current event selection.



Future Enhancements



Environmental Mapper

- Addition of more layers
- Geocoder
- Development of a secure version that can be used for risk assessment

Environmental Mapper

You can try out the Mappers at the following links

RPON Mapper:

<http://gis.dhss.mo.gov/website/RPON/viewer.htm>

HSEES Mapper:

<http://gis.dhss.mo.gov/website/HSEES/maphtm/viewer.htm>

For Further Information:



Jeff Patridge, GIS Analyst

Missouri Office of Administration

Information Technology Services Division

Jeff.Patridge@dhss.mo.gov

